

4 AUXILIARY MACHINERY

4.1 Questions – Heat Exchangers

1. Which points need to be considered in the design/selection of a heat exchanger?
2. Define streamline and turbulent flow. What is the importance of streamline and turbulent flow to the design/selection of heat exchangers?
3. Sketch and describe a shell and tube type heat exchanger.
4. Sketch and describe a plate type heat exchanger.
5. What are the principal advantages of plate type heat exchangers?
6. What are the functions of a condenser?
7. What are the two principal types of condenser?
8. Sketch and describe an 'end on' or axial exhaust regenerative condenser.
9. List the materials used in the construction of a condenser
10. How are tubes fixed in a condenser?
11. How is a defective condenser tube located?

4.2 Questions – Pumps

1. Describe the passage of water through a centrifugal pump.
2. Sketch and describe a centrifugal pump showing the impeller and volute casing.
3. What are positive displacement pumps?

4. What are dynamic pressure pumps?
5. Sketch an axial flow pump.
6. Sketch and describe a gear pump.
7. Sketch and describe a piston pump.
8. What type of pump would you choose to use as an emergency bilge pump?
9. What is cavitation? When and where might it occur?

4.3 Questions – Filters

1. Sketch and describe an auto-klean strainer.
2. Sketch and describe a streamline lubricating oil filter.
3. What is coalescing action?
4. What is the size limit of particles which can be removed using an auto-klean strainer?
5. Where are pressure gauges fitted on the auto-klean filter?
6. How is a lubricating oil coalescer-filter cleaned?
7. Sketch the back flush cleaning arrangement of an automatic oil filter module.

4.4 Questions – Stabilisers

1. Where are stabilising fins fitted?
2. What is the purpose of the tail flap?
3. What is the angle of operation of the main fin?
4. What is the angle of operation of the tail flap?

5. What is the hydraulic pressure required to extend and house the fins?
6. What is the hydraulic pressure required to alter fin angle?
7. What instrument is used to sense the motion of the ship and then send a signal to the fin controls?
8. What panel is fitted to the bridge controls to monitor fin position?

4.5 Questions – Refrigeration

1. Name the four basic components of a refrigeration system, working on the vapour compression cycle.
2. Explain the function of the compressor.
3. Explain the function of the condenser.
4. Explain the function of the expansion valve.
5. Explain the purpose of the evaporator.
6. Name three desirable properties of a refrigerant.
7. Where is the high pressure cut out fitted in the refrigeration circuit?
8. What are the effects of insufficient refrigerant in the system?

5 ENGINE ROOM SYSTEMS

5.1 Questions – Bilge and Ballast System

1. Make a diagrammatic sketch of a bilge pumping system.
2. Itemise the main components of the bilge pumping system.
3. Make a diagrammatic sketch of a ballast pumping system.
4. Itemise the main components of a ballast pumping system.
5. What type of valve will be used in the ballast system?
6. What type of valve will be used in the bilge system?
7. Sketch a bilge injection valve.
8. What is the function of a bilge injection valve?
9. What should the diameter of the bilge injection valve be in relation to the diameter of the main sea inlet?
10. What is the function of the bilge system?
11. What is the function of the ballast system?

5.2 Questions – Fresh Water and Seawater Cooling Systems

1. What are the advantages of a central cooling system?
2. List the four checking and treatment procedures used to reduce the possibility of damage to fresh water systems.
3. How may corrosion occur in a fresh water cooling system?
4. What is the purpose of the expansion tank in a fresh water cooling system?

5. Sketch a system diagram for cooling a diesel engine which does not use a central cooling system.
6. When is the upper sea suction valve used?
7. When is the lower sea suction valve used?
8. Why may steam and compressed air be supplied to the seachest valve?
9. Sketch and describe a system which makes it possible to heat the main engines by means of cooling water from the auxiliary engines.
10. What are the advantages of the above system?

5.3 Questions – Fuel Oil System

1. Sketch and describe a fuel oil system for use with a boiler.
2. Sketch and describe a fuel oil system suitable for use with a diesel engine.
3. Sketch and describe a settling tank.
4. What is the function of the settling tank?
5. Why is the temperature of fuel oil raised before burning?
6. How is the correct oil temperature maintained?
7. Two emergency valves are fitted in a boiler fuel oil system. What are their locations and functions?
8. What is the purpose of a recirculating valve fitted in the boiler fuel oil system?
9. List the safety fittings in a boiler fuel oil system.
10. Describe how a boiler fuel oil system can be changed from automatic to manual control.